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## **IN THE CLAIMS**

Please substitute the following listing of claims for the previous listing of claims.

1. (currently amended) A process chamber for processing a substrate in a process gas and reducing emissions of hazardous gas to the environment, the process chamber comprising:

- (a) a support capable of supporting the substrate;
- (b) a gas distributor capable of introducing process gas into the process chamber;
- (c) a gas activator capable of activating the process gas to perform a process in the process chamber thereby forming effluent containing hazardous gas;
- (d) an exhaust tube through which the effluent may be flowed, the exhaust tube being adapted to provide a non-circuitous and non-turbulent flow of effluent therethrough by being substantially absent projections or recesses (i) that alter the flow direction of the effluent to provide a circuitous flow of effluent through the exhaust tube, and (ii) that cause turbulence in the flow of the effluent through the exhaust tube; and
- (e) an RF energy applicator to couple RF energy to the effluent flowing through in the exhaust tube to reduce the hazardous gas content of the effluent.

2. (previously presented) The process chamber of claim 1 wherein the exhaust tube comprises a length that is sufficiently long to reduce the hazardous gas content of a continuous stream of the effluent flowing through the exhaust tube without recirculating the effluent in the exhaust tube.

3. (previously presented) The process chamber of claim 1 wherein the exhaust tube comprises a length that is sufficiently long to provide a residence time of the effluent that is at least about 0.01 seconds.

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4. (previously presented) The process chamber of claim 1 wherein the exhaust tube is adapted to provide a laminar flow of effluent therethrough.

5. (previously presented) The process chamber of claim 4 wherein the exhaust tube comprises a cylinder having an axis parallel to the direction of the flow of the effluent through the exhaust tube.

6. (previously presented) The process chamber of claim 1 further comprising a reagent gas mixer capable of mixing a reagent gas with the effluent.

7-8. (canceled)

9. (previously presented) The process chamber of claim 1 wherein the exhaust tube comprises an inlet and an outlet that are substantially facing each other in an opposing relationship.

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10. (currently amended) A gas treatment apparatus for reducing a hazardous gas content of an effluent from a process chamber, the gas treatment apparatus comprising:

- (a) an exhaust tube through which effluent from the process chamber may be flowed;
- (b) an RF energy applicator to couple RF energy to the effluent ~~flowing through in~~ the exhaust tube to reduce the hazardous gas content of the effluent;
- (c) a gas analyzer capable of monitoring the hazardous gas content of the effluent and providing a signal in relation to the hazardous gas content of the effluent; and
- (d) a computer controller system comprising program code capable of monitoring the signal from the gas analyzer, determining whether the hazardous gas content of the effluent exceeds a safety level, and if the hazardous gas content is determined to exceed the safety level, performing at least one of the following:
  - (i) adjusting a power applied to the RF energy applicator to reduce the hazardous gas content in the effluent,
  - (ii) adjusting process conditions in the process chamber to reduce the hazardous gas content in the effluent without terminating the process,
  - (iii) activating an alarm or metering display,
  - (iv) adding a reagent gas to the effluent before or after the effluent is energized, to reduce the hazardous gas content in the effluent, or
  - (v) terminating the process being conducted in the process chamber.

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11. (currently amended) A process chamber for processing a substrate and reducing emissions of hazardous gas to the environment, the process chamber comprising:

- (a) a support capable of supporting the substrate in the process chamber,
- (b) a gas distributor capable of introducing process gas into the process chamber;
- (c) a gas activator capable of activating the process gas to process the substrate, thereby forming an effluent containing hazardous gas; and
- (d) an exhaust tube through which the effluent may be flowed;
- (e) an RF energy applicator to couple RF energy to the effluent to energize the effluent;
- (f) a gas analyzer capable of monitoring the hazardous gas content of the effluent in the exhaust tube and providing a signal in relation to the hazardous gas content of the effluent; and
- (g) a computer controller system comprising program code capable of monitoring the signal from the gas analyzer, and determining whether the hazardous gas content of the effluent exceeds a safety level, and if the hazardous gas content is determined to exceed the safety level, performing at least one of the following:
  - (i) adjusting a power applied to the RF microwave energy applicator to reduce the hazardous gas content in the effluent,
  - (ii) adjusting process conditions in the process chamber to reduce the hazardous gas content in the effluent,
  - (iii) activating an alarm or metering display,
  - (iv) adding a reagent gas to the effluent before or after the effluent is energized, to reduce the hazardous gas content in the effluent, or
  - (v) terminating the process being conducted in the process chamber.

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12-13. (canceled)

14. (previously presented) The process chamber of claim 11 wherein the RF energy applicator is a microwave energy applicator to couple microwave energy to the effluent.

15. (previously presented) The process chamber of claim 11 wherein the exhaust tube comprises sapphire.

16. (canceled)

17. (withdrawn) A method of reducing the hazardous gas content of an effluent formed during processing of a semiconductor substrate, the method comprising the steps of:

- (a) flowing a continuous stream of the effluent through an exhaust tube; and
- (b) coupling microwaves or RF energy into the exhaust tube to reduce the hazardous gas content in the continuous stream of effluent flowing through the exhaust tube without recirculation of the effluent in the exhaust tube.

18. (withdrawn) The method of claim 17 wherein step (a) comprises the step of flowing the effluent through a path length that is sufficiently long to reduce the hazardous gas content of the effluent as a continuous stream of effluent flows through the exhaust tube.

19. (withdrawn) The method of claim 17 wherein step (a) comprises the step of flowing the effluent through a path length that is sufficiently long to provide a residence time of effluent in the exhaust tube that is at least about 0.01 seconds.

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20. (withdrawn) The method of claim 17 wherein step (a) comprises the step of flowing the effluent in a substantially laminar flow through the exhaust tube.

21. (withdrawn) The method of claim 17 further comprising the step of introducing a reagent gas into the effluent to further reduce the hazardous gas content of the effluent.

22. (withdrawn) The method of claim 21 wherein the volumetric flow ratio of reagent gas to effluent is sufficiently high to abate substantially all the hazardous gas content of the effluent.

23. (withdrawn) The method of claim 17 further comprising the steps of:  
(1) analyzing the hazardous gas content of the effluent emitted from the exhaust tube; and

(2) determining if the content of the hazardous gas in the effluent emitted from the exhaust tube exceeds a safety level, and upon such determination, performing at least one of the steps of:

(i) adjusting the operating power level of the gas energizer to reduce the hazardous gas content in the effluent,

(ii) adjusting the process conditions in the process chamber to reduce the hazardous gas content in the effluent,

(iii) activating an alarm or metering display,

(iv) adding a reagent gas to the effluent gas before or after the effluent gas is energized, to reduce the hazardous gas content in the effluent, or

(v) terminating the process being conducted in the process chamber.

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24. (currently amended) A process chamber for processing a substrate in a process gas and reducing emissions of hazardous gas to the environment, the process chamber comprising:

- (a) a support capable of supporting the substrate;
- (b) a gas distributor capable of introducing process gas into the process chamber;
- (c) a gas activator capable of activating the process gas to process the substrate thereby forming an effluent containing hazardous gas;
- (d) ~~an~~ a monocrystalline sapphire exhaust tube through which the effluent may be flowed, the exhaust tube being substantially absent projections or recesses; and
- (e) a microwave energy applicator adapted to couple microwaves to the effluent to reduce the hazardous gas content of the effluent.

25. (canceled)

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26. (previously presented) A process chamber for processing a substrate in a process gas and reducing emissions of a hazardous gas to the environment, the process chamber comprising:

(a) a support capable of supporting the substrate, a gas distributor capable of introducing process gas into the process chamber, and a gas activator capable of activating the process gas to process the substrate, thereby forming an effluent containing hazardous gas;

(b) an exhaust tube capable of exhausting the effluent from the process chamber and a gas energizer adapted to energize the effluent in the exhaust tube to reduce a hazardous gas content of the effluent;

(c) a gas analyzer adapted to monitor the hazardous gas content of the effluent in the exhaust tube and to provide a signal in relation to the hazardous gas content of the effluent; and

(d) a computer controller system comprising program code capable of monitoring the output signal from the gas analyzer, determining whether the hazardous gas content of the effluent exceeds a safety level, and if the hazardous gas content of the effluent is determined to exceed the safety level, performing at least one of:

(i) adjusting a power applied to the gas energizer to reduce the hazardous gas content in the effluent,

(ii) adjusting process conditions in the process chamber to reduce the hazardous gas content in the effluent without terminating the process,

(iii) activating an alarm or metering display,

(iv) adding a reagent gas to the effluent before or after the effluent is energized, to reduce the hazardous gas content in the effluent, or

(v) terminating the process being conducted in the process chamber.



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27. (previously presented) The process chamber of claim 26 wherein the program code comprises one or more of:

- (1) gas analyzer program code for receiving the signal from the gas analyzer, and storing or passing the signal to other program codes,
- (2) gas energizer program code for adjusting a power level of the microwave applicator in relation to the signal,
- (3) reagent gas program code for operating a reagent gas mixer that adds reagent gas to the effluent in relation to the signal, and
- (4) safety operational program code that, upon receiving an output signal indicating that the hazardous gas content of the energized effluent exceeds a safety level, performs at least one of (1) adjusting process conditions in the process chamber to reduce the hazardous gas content, (2) operating an alarm, (3) providing a metering display that shows the level of the hazardous gas content, or (4) shutting down the process chamber.

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28. (currently amended) A computer program product for operating a gas treatment apparatus and process chamber, to reduce the hazardous gas content of an effluent formed during processing of a substrate in the process chamber, the gas treatment apparatus comprising an exhaust tube capable of exhausting effluent from the process chamber, a gas energizer adapted to energize the effluent in the exhaust tube to reduce the hazardous gas content of the effluent, and a gas analyzer adapted to monitor the hazardous gas content of the effluent in the exhaust tube and provide a signal in relation to the hazardous gas content of the effluent, the computer program product comprising computer readable program code, the computer readable program code comprising:

(a) gas analyzer program code for receiving the signal from the gas analyzer, and storing or passing the signal to other program codes; and

(b) safety operational program code adapted to determine whether that, upon receiving a signal indicating that the hazardous gas content of the effluent exceeds a safety level, and if the hazardous gas content of the effluent is determined to exceed the safety level, performs performing at least one of (1) adjusting process conditions in the process chamber to reduce the hazardous gas content, (2) operating an alarm, (3) providing a metering display that shows the level of the hazardous gas content, or (4) shutting down the process chamber.

29. (previously presented) The computer program product of claim 28 wherein the computer readable program code comprises program code for adjusting a power level of the microwave energy applicator in relation to the signal to reduce the hazardous gas content of the effluent.

30. (previously presented) The computer program product of claim 28 wherein the computer readable program code comprises reagent gas program code for adding reagent gas to the effluent in relation to the signal to reduce the hazardous gas content of the effluent.

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31. (previously presented) The process chamber of claim 1 wherein the RF energy applicator comprises a waveguide to couple RF energy to the effluent in the exhaust tube.

32. (currently amended) The process chamber of claim 18 wherein the RF energy applicator comprises facing electrodes or an inductor coil.

33. (previously presented) The process chamber of claim 14 wherein the microwave energy applicator comprises a waveguide to couple microwaves to the effluent in the exhaust tube.

34. (previously presented) The process chamber of claim 11 wherein the RF energy applicator comprises facing electrodes or an inductor coil.

35. (previously presented) The process chamber of claim 24 wherein the RF energy applicator comprises a waveguide to couple RF energy to the effluent in the exhaust tube.

36. (previously presented) The process chamber of claim 26 wherein the RF energy applicator comprises facing electrodes or an inductor coil.

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37. (previously presented) The process chamber of claim 1 further comprising:

(a) a gas analyzer adapted to monitor the hazardous gas content of the effluent in the exhaust tube and to provide a signal in relation to the hazardous gas content of the effluent; and

(b) a computer controller system comprising computer readable program code capable of monitoring the signal from the gas analyzer, determining whether the hazardous gas content of the effluent exceeds a safety level, and if the hazardous gas content is determined to exceed the safety level, performing at least one of:

(i) adjusting a power applied to the gas energizer to reduce the hazardous gas content in the effluent,

(ii) adjusting process conditions in the process chamber to reduce the hazardous gas content in the effluent without terminating the process,

(iii) activating an alarm or metering display,

(iv) adding a reagent gas to the effluent before or after the effluent is energized, to reduce the hazardous gas content in the effluent, or

(v) terminating the process being conducted in the process chamber.

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38. (previously presented) The process chamber of claim 37 wherein the computer readable program code on the computer readable medium comprises one or more of:

(1) gas analyzer program code for receiving the signal from the gas analyzer, and storing or passing the signal to other program codes,

(2) gas energizer program code for adjusting a power level of the microwave applicator in relation to the signal,

(3) reagent gas program code for operating a reagent gas mixer that adds reagent gas to the effluent in relation to the signal, and

(4) safety operational program code that upon receiving a signal that the hazardous gas content of the energized effluent exceeds a safety level, performs at least one of (1) adjusting process conditions in the process chamber to reduce the hazardous gas content, (2) operating an alarm, (3) providing a metering display that shows the level of the hazardous gas content, or (4) shutting down the process chamber.

39. (previously presented) The process chamber of claim 1 wherein the exhaust tube comprises monocrystalline sapphire.

40. (previously presented) The apparatus of claim 10 wherein the exhaust tube is substantially absent projections or recesses (i) that alter the flow direction of the effluent to provide a circuitous flow of effluent through the exhaust tube, and (ii) that cause turbulence in the flow of the effluent through the exhaust tube.

41. (previously presented) The apparatus of claim 10 wherein the exhaust tube comprises a length that is sufficiently long to reduce the hazardous gas content of the effluent flowing through the exhaust tube without recirculating the effluent in the exhaust tube.

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42. (previously presented) The apparatus of claim 10 wherein the exhaust tube comprises a length that is sufficiently long to provide a residence time of the effluent that is at least about 0.01 seconds.

43. (previously presented) The apparatus of claim 10 wherein the exhaust tube is adapted to provide a laminar flow of effluent therethrough.

44. (previously presented) The apparatus of claim 43 wherein the exhaust tube comprises a cylinder having an axis parallel to the direction of the flow of the effluent through the exhaust tube.

45. (previously presented) The apparatus of claim 10 further comprising a reagent gas mixer to mix the reagent gas with the effluent.

46. (previously presented) The apparatus of claim 10 wherein the exhaust tube comprises sapphire.

47. (previously presented) The apparatus of claim 46 wherein the sapphire comprises monocrystalline sapphire.

48. (previously presented) The apparatus of claim 10 wherein the RF energy applicator is a microwave energy applicator to couple microwave energy to the effluent.

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49. (previously presented) The apparatus of claim 10 wherein the program code comprises one or more of:

- (1) gas analyzer program code for receiving the signal from the gas analyzer, and storing or passing the signal to other program codes,
- (2) gas energizer program code for adjusting a power level of the microwave applicator in relation to the signal,
- (3) reagent gas program code for operating a reagent gas mixer that adds reagent gas to the effluent in relation to the signal, and
- (4) safety operational program code that, upon receiving a signal indicating that the hazardous gas content of the effluent exceeds a safety level, performs at least one of (1) adjusting process conditions in the process chamber to reduce the hazardous gas content, (2) operating an alarm, (3) providing a metering display that shows the level of the hazardous gas content, or (4) shutting down the process chamber.

50. (previously presented) The process chamber of claim 11 wherein the exhaust tube is substantially absent projections or recesses (i) that alter the flow direction of the effluent to provide a circuitous flow of effluent through the exhaust tube, and (ii) that cause turbulence in the flow of the effluent through the exhaust tube.

51. (previously presented) The process chamber of claim 11 wherein the exhaust tube is adapted to provide a laminar flow of effluent therethrough.

52. (previously presented) The process chamber of claim 51 wherein the exhaust tube comprises a cylinder having an axis parallel to the direction of the flow of the effluent through the exhaust tube.

53. (previously presented) The process chamber of claim 11 further comprising a reagent gas mixer to mix the reagent gas with the effluent.

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54. (previously presented) The process chamber of claim 11 wherein the computer readable program code comprises one or more of:

- (1) gas analyzer program code for receiving the signal from the gas analyzer, and storing or passing the signal to other program codes,
- (2) gas energizer program code for adjusting a power level of the microwave applicator in relation to the signal,
- (3) reagent gas program code for operating a reagent gas mixer that adds reagent gas to the effluent in relation to the signal, and
- (4) safety operational program code that, upon receiving a signal indicating that the hazardous gas content of the effluent exceeds a safety level, performs at least one of (1) adjusting process conditions in the process chamber to reduce the hazardous gas content, (2) operating an alarm, (3) providing a metering display that shows the level of the hazardous gas content, or (4) shutting down the process chamber.

55. (previously presented) The process chamber of claim 15 wherein the sapphire comprises monocrystalline sapphire.

56. (previously presented) The process chamber of claim 24 wherein the exhaust tube is substantially absent projections or recesses (i) that alter the flow direction of the effluent to provide a circuitous flow of effluent through the exhaust tube, and (ii) that cause turbulence in the flow of the effluent through the exhaust tube.

57. (previously presented) The process chamber of claim 24 wherein the exhaust tube comprises a length that is sufficiently long to reduce the hazardous gas content of the effluent flowing through the exhaust tube without recirculating the effluent in the exhaust tube.

58. (previously presented) The process chamber of claim 24 wherein the exhaust tube comprises a length that is sufficiently long to provide a residence time of the effluent that is at least about 0.01 seconds.

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59. (previously presented) The process chamber of claim 24 wherein the exhaust tube is adapted to provide a laminar flow of effluent therethrough.

60. (previously presented) The process chamber of claim 59 wherein the exhaust tube comprises a cylinder having an axis parallel to the direction of the flow of the effluent through the exhaust tube.

61. (previously presented) The process chamber of claim 24 further comprising a reagent gas mixer to mix the reagent gas with the effluent.

62. (previously presented) The process chamber of claim 24 wherein the exhaust tube comprises monocrystalline sapphire.

63. (canceled)

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64. (previously presented) The process chamber of claim 24 further comprising:

(a) a gas analyzer adapted to monitor the hazardous gas content of the effluent in the exhaust tube and to provide a signal in relation to the hazardous gas content of the effluent; and

(b) a computer controller system comprising program code capable of monitoring the signal from the gas analyzer, determining whether the hazardous gas content of the effluent exceeds a safety level, and if the hazardous gas content is determined to exceed the safety level, performing at least one of:

(i) adjusting a power applied to the gas energizer to reduce the hazardous gas content in the effluent,

(ii) adjusting process conditions in the process chamber to reduce the hazardous gas content in the effluent without terminating the process,

(iii) activating an alarm or metering display,

(iv) adding a reagent gas to the effluent before or after the effluent is energized, to reduce the hazardous gas content in the effluent, or

(v) terminating the process being conducted in the process chamber.

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65. (previously presented) The process chamber of claim 64 wherein the program code comprises one or more of:

- (1) gas analyzer program code for receiving the signal from the gas analyzer, and storing or passing the signal to other program codes,
- (2) gas energizer program code for adjusting a power level of the microwave applicator in relation to the signal,
- (3) reagent gas program code for operating a reagent gas mixer that adds reagent gas to the effluent in relation to the signal, and
- (4) safety operational program code that, upon receiving a signal indicating that the hazardous gas content of the effluent exceeds a safety level, performs at least one of (1) adjusting process conditions in the process chamber to reduce the hazardous gas content, (2) operating an alarm, (3) providing a metering display that shows the level of the hazardous gas content, or (4) shutting down the process chamber.

66. (previously presented) The process chamber of claim 26 wherein the exhaust tube is substantially absent projections or recesses (i) that alter the flow direction of the effluent to provide a circuitous flow of effluent through the exhaust tube, and (ii) that cause turbulence in the flow of the effluent through the exhaust tube.

67. (previously presented) The process chamber of claim 26 wherein the exhaust tube comprises a length that is sufficiently long to reduce the hazardous gas content of the effluent flowing through the exhaust tube without recirculating the effluent in the exhaust tube.

68. (previously presented) The process chamber of claim 26 wherein the exhaust tube comprises a length that is sufficiently long to provide a residence time of the effluent that is at least about 0.01 seconds.

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69. (previously presented) The process chamber of claim 26 wherein the exhaust tube is adapted to provide a laminar flow of effluent therethrough.

70. (previously presented) The process chamber of claim 69 wherein the exhaust tube comprises a cylinder having an axis parallel to the direction of the flow of the effluent through the exhaust tube.

71. (previously presented) The process chamber of claim 26 further comprising a reagent gas mixer to mix the reagent gas with the effluent.

72. (previously presented) The process chamber of claim 26 wherein the exhaust tube comprises monocrystalline sapphire.

73. (previously presented) The process chamber of claim 26 wherein the gas energizer comprises an RF energy applicator to couple RF energy to the effluent.

74. (canceled)

75. (previously presented) The apparatus of claim 10 wherein the exhaust tube is adapted to provide a non-circuitous flow of effluent therethrough.

76. (previously presented) The process chamber of claim 11 wherein the exhaust tube is adapted to provide a non-circuitous flow of effluent therethrough.

77. (previously presented) The process chamber of claim 24 wherein the exhaust tube is adapted to provide a non-circuitous flow of effluent therethrough.

78. (previously presented) The process chamber of claim 26 wherein the exhaust tube is adapted to provide a non-circuitous flow of effluent therethrough.

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79. (currently amended) A process chamber for processing a substrate in a process gas and reducing emissions of hazardous gas to the environment, the process chamber comprising:

- (a) a support capable of supporting the substrate;
- (b) a gas distributor capable of introducing process gas into the process chamber;
- (c) a gas activator capable of activating the process gas to perform a process in the process chamber thereby forming effluent containing hazardous gas;
- (d) an exhaust tube through which the effluent may be flowed, substantially the entire internal flow surface of the exhaust tube being parallel to a single direction of the flow of the effluent through the exhaust tube; and
- (e) a microwave energy applicator to couple microwaves to the effluent ~~flowing through in~~ the exhaust tube to reduce the hazardous gas content of the effluent.

80. (currently amended) A process chamber for processing a substrate in a process gas and reducing emissions of hazardous gas to the environment, the process chamber comprising:

- (a) a support capable of supporting the substrate;
- (b) a gas distributor capable of introducing process gas into the process chamber;
- (c) a gas activator capable of activating the process gas to perform a process in the process chamber thereby forming effluent containing hazardous gas;
- (d) an exhaust tube through which the effluent may be flowed, the exhaust tube comprising an inlet and an outlet that are substantially facing each other in an opposing relationship; and
- (e) a microwave energy applicator to couple microwaves to the effluent ~~flowing through in~~ the exhaust tube to reduce the hazardous gas content of the effluent.

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81. (currently amended) A process chamber for processing a substrate and reducing emissions of hazardous gas to the environment, the process chamber comprising:

- (a) a support capable of supporting the substrate in the process chamber;
- (b) a gas distributor capable of introducing process gas into the process chamber;
- (c) a gas activator capable of activating the process gas to process the substrate, thereby forming an effluent containing hazardous gas; and
- (d) an exhaust tube through which the effluent may be flowed;
- (e) an RF energy applicator to couple RF energy to the effluent in the exhaust tube to energize the effluent;
- (f) a gas analyzer capable of monitoring the hazardous gas content of the effluent in the exhaust tube and providing a signal in relation to the hazardous gas content of the effluent; and
- (g) a computer controller system comprising program code capable of monitoring the signal from the gas analyzer, and determining whether the hazardous gas content of the effluent exceeds a safety level, and if the hazardous gas content is determined to exceed the safety level, adjusting a power applied to the ~~microwave~~ RF energy applicator to reduce the hazardous gas content in the effluent.

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82. (currently amended) A process chamber for processing a substrate and reducing emissions of hazardous gas to the environment, the process chamber comprising:

(a) a support capable of supporting the substrate in the process chamber;

(b) a gas distributor capable of introducing process gas into the process chamber;

(c) a gas activator capable of activating the process gas to process the substrate, thereby forming an effluent containing hazardous gas; and

(d) an exhaust tube through which the effluent may be flowed;

(e) an RF energy applicator to couple RF energy to the effluent to energize the effluent;

(f) a gas analyzer capable of monitoring the hazardous gas content of the effluent in the exhaust tube and providing a signal in relation to the hazardous gas content of the effluent; and

(g) a computer controller system comprising program code capable of monitoring the signal from the gas analyzer, and determining whether the hazardous gas content of the effluent exceeds a safety level, and if the hazardous gas content is determined to exceed the safety level, adjusting process conditions in the process chamber to reduce the hazardous gas content in the effluent, ~~effluent~~;

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83. (previously presented) A process chamber for processing a substrate and reducing emissions of hazardous gas to the environment, the process chamber comprising:

- (a) a support capable of supporting the substrate in the process chamber;
- (b) a gas distributor capable of introducing process gas into the process chamber;
- (c) a gas activator capable of activating the process gas to process the substrate, thereby forming an effluent containing hazardous gas; and
- (d) an exhaust tube through which the effluent may be flowed;
- (e) an RF energy applicator to couple RF energy to the effluent to energize the effluent;
- (f) a gas analyzer capable of monitoring the hazardous gas content of the effluent in the exhaust tube and providing a signal in relation to the hazardous gas content of the effluent; and
- (g) a computer controller system comprising program code capable of monitoring the signal from the gas analyzer, and determining whether the hazardous gas content of the effluent exceeds a safety level, and if the hazardous gas content is determined to exceed the safety level, activating an alarm or metering display.



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84. (currently amended) A process chamber for processing a substrate and reducing emissions of hazardous gas to the environment, the process chamber comprising:

- (a) a support capable of supporting the substrate in the process chamber;
- (b) a gas distributor capable of introducing process gas into the process chamber;
- (c) a gas activator capable of activating the process gas to process the substrate, thereby forming an effluent containing hazardous gas; and
- (d) an exhaust tube through which the effluent may be flowed;
- (e) an RF energy applicator to couple RF energy to the effluent to energize the effluent;
- (f) a gas analyzer capable of monitoring the hazardous gas content of the effluent in the exhaust tube and providing a signal in relation to the hazardous gas content of the effluent; and
- (g) a computer controller system comprising program code capable of monitoring the signal from the gas analyzer, and determining whether the hazardous gas content of the effluent exceeds a safety level, and if the hazardous gas content is determined to exceed the safety level, adding a reagent gas to the effluent before or after the effluent is energized, the reagent gas being added at a flow rate that is sufficiently high to reduce the hazardous gas content in the effluent.

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85. (previously presented) A process chamber for processing a substrate and reducing emissions of hazardous gas to the environment, the process chamber comprising:

- (a) a support capable of supporting the substrate in the process chamber;
- (b) a gas distributor capable of introducing process gas into the process chamber;
- (c) a gas activator capable of activating the process gas to process the substrate, thereby forming an effluent containing hazardous gas; and
- (d) an exhaust tube through which the effluent may be flowed;
- (e) an RF energy applicator to couple RF energy to the effluent to energize the effluent;
- (f) a gas analyzer capable of monitoring the hazardous gas content of the effluent in the exhaust tube and providing a signal in relation to the hazardous gas content of the effluent; and
- (g) a computer controller system comprising program code capable of monitoring the signal from the gas analyzer, and determining whether the hazardous gas content of the effluent exceeds a safety level, and if the hazardous gas content is determined to exceed the safety level, terminating the process being conducted in the process chamber.

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86. (new) An apparatus for processing a substrate in a process gas and reducing emissions of hazardous gas to the environment, the apparatus comprising:

a process chamber comprising:

(a) a support capable of supporting the substrate;

(b) a gas distributor capable of introducing process gas into the process chamber; and

(c) a gas activator capable of activating the process gas to process the substrate thereby forming an effluent containing hazardous gas; and

a gas treatment apparatus comprising:

(a) a monocrystalline sapphire exhaust tube through which the effluent may be flowed, the exhaust tube comprising an inlet to receive the effluent from the process chamber, and an outlet to release the effluent; and

(b) a gas energizer adapted to couple energy to the effluent in the exhaust tube to reduce the hazardous gas content of the effluent.